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**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to Establish
Policies, Processes, and Rules to Ensure
Reliable Electric Service in California in the
Event of an Extreme Weather Event in
2021.

Rulemaking 20-11-003
(Filed November 19, 2020)

**THE PROTECT OUR COMMUNITIES FOUNDATION
OPENING COMMENTS ON ORDER INSTITUTING RULEMAKING IN
EMERGENCY RELIABILITY**

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Dated: November 30, 2020

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**THE PROTECT OUR COMMUNITIES FOUNDATION
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RELIABILITY**

Pursuant to Rule 14.3 of the California Public Utilities Commission (Commission) Rules of Practice and Procedure (Rules), The Protect Our Communities Foundation (POC) respectfully submits the following opening comments on the Order Instituting Rulemaking (OIR) to Establish Policies, Processes, and Rules to Ensure Reliable Electric Service in California in the Event of an Extreme Weather Event in 2021.

The OIR divides the proceeding into two categories: 1) directing each investor-owned utility (IOU) to develop new supply-side resources to the extent they can be brought online in 2021 and to bring additional capacity online by procuring incremental capacity from existing resources, including implementing efficiency upgrades to existing generators, and retrofitting existing generators that are set to retire, such as Once-Through-Cooling (OTC) generators, and 2) options for engaging various customer groups in load reduction programs. PCF suggests that the rulemaking's goal of immediate procurement remains premature as the CAISO's preliminary root cause analysis is just that – preliminary – and the CAISO itself has announced that it will publish a more fulsome analysis by the end of the year. Until that more complete review occurs, proceeding to order additional expedited procurement will be not only premature but likely inaccurate and therefore unreasonable.

Importantly, the OIR alludes to the most substantial causes of the August 14-15, 2020 blackouts: 1) scheduling coordinators under-scheduling demand by 1,000s of MW in the day-ahead market, and 2) CAISO authorizing thousands of MW of resource adequacy (RA) capacity exports to neighboring states

as a result, with the exports continuing even as CAISO initiated rolling blackouts in California.¹ However, the OIR requests no comment from the parties on these issues, while requesting detailed commentary on a host of questions related to increasing supply and decreasing demand in the summer of 2021. PCF recommends that the Commission and this proceeding address the operational deficiencies in CAISO's management of the grid that led to the August 14-15, 2020 rolling blackouts, including the CAISO's decision to allow thousands of megawatts of electricity exports during the historic California heatwave. Without considering the CAISO's decision to continue exports in the face of shortage, the Commission cannot solve the problem – no matter how much additional procurement it orders – if the CAISO continues to allow exports of that procurement. Thus, including the critical analysis of the CAISO's grid operation practices must be a primary focus of this proceeding.

I. OTHER OPPORTUNITIES EXIST TO INCREASE SUPPLY FOR THE SUMMER OF 2021 – AND CALIFORNIA MUST RECTIFY OPERATIONAL DEFICIENCIES IN CAISO'S MANAGEMENT OF THE GRID DURING HEAT WAVES

PCF submits that the evidence will establish that the August 14-15, 2020 rolling blackouts were caused by operational deficiencies in CAISO's management of the ample supply resources that this Commission had ordered the LSEs to procure and which CAISO had at its disposal on those days. The prioritization by CAISO of exports over CAISO load during heat waves stands as but one example of the kind of operational deficiency that contributed to – if not caused – the rolling blackouts. The OIR states that “this OIR will determine whether, for purposes of determining when capacity can be exported from the CAISO-controlled grid, particularly during reliability events, a resource that provides RA capacity can be tagged such that it would not be exported during these critical times.”² However, this overarching issue identified in the OIR is excluded from the issues for which comments from the parties are sought (see pp. 12-15). This oversight should be rectified immediately, at this initial stage of the proceeding.

The CAISO's own Department of Market Monitoring (DMM) confirms that it initially assumed that CAISO's tariff would prioritize CAISO load over exports in supply-constrained situations like the

¹ OIR, p. 5. “Also, we note that CAISO exported approximately 4,500 MW on August 14. Preliminary Root Cause Analysis at 100.”

² OIR, pp. 9-10.

August 14-15, 2020 heat wave.³ Yet CAISO allowed thousands of MWs of exports to continue uninterrupted as it initiated rolling blackouts in California. The DMM describes the prioritizing of CAISO load over exports as CAISO policy, citing to the applicable CAISO tariff as the source of its understanding, and yet the opposite happened when it counted on August 14-15, 2020. The result was rolling blackouts on two consecutive days under relatively typical summer peak load conditions. The DMM raised the concern that the ISO's policy "may not be aligned with export curtailment policies of other Western balancing authorities"⁴ a misalignment that the Commission should analyze and explore within the context of this proceeding.

Another deficiency accepted by CAISO was the failure to dispatch all of the available "long start" OTC units. Neither Alamos 4 (336 MW net qualifying capacity) nor Ormond Beach 1 (741 MW net qualifying capacity) were not in planned or forced outage on August 13, 2020, but neither was dispatched in sufficient time to be providing significant power on August 14th when the rolling blackout was initiated by CAISO. The combined net qualifying capacity of these two units totals 1,077 MW.⁵ The magnitude of the blackout on August 14th equaled 1,000 MW.

CAISO allowed almost 400 MW of planned outages on August 14, 2020.⁶ Planned outages should be prohibited in months when heat waves are a reasonable possibility, yet that did not happen in August 2020.

PG&E declared 1,150 MW Diablo Canyon Unit 2 in forced outage, with 0 MW of curtailment, the same day (August 12, 2020) that CAISO issued a Restricted Maintenance Operation (RMO) order in the run-up to the heat wave that began in earnest on August 14, 2020. This advisory of a potential Unit 2 forced outage was lifted by PG&E on August 16, 2020. Diablo Canyon Unit 2 was in forced outage in the second half of July 2020 due to a hydrogen leak at a weld on a cooling water manifold.⁷ The leak

³ CAISO DMM, *Report on system and market conditions, issues and performance: August and September 2020*, November 24, 2020, p. 71. "Prior to the August heat wave, the CAISO tariff and business practice manuals described day-ahead market exports not supported by specific generation being clearly prioritized below CAISO load in real-time. Therefore, it was DMM's understanding that CAISO already had such a carefully defined process in place. Now, it is DMM's understanding that CAISO may not have such a procedure and that its policy may not be aligned with export curtailment policies of other western balancing areas."

⁴ Ibid.

⁵ CAISO, Response of CAISO to Data Request Number PCF-CAISO-2020RA-02 by Protect Our Communities Foundation, R.19-11-009, November 16, 2020. See **Attachment A**.

⁶ CAISO/CPUC/CEC, *Preliminary Root Cause Analysis*, October 6, 2020, p. 8.

⁷ PG&E, PG&E Letter DCL-20-077 to U.S. Nuclear Regulatory Commission, *Unit 2 Licensee Event Report 2020-002-00, Unit 2 Manual Reactor Trip Due to Increased Main Generator Hydrogen Usage*, September 15, 2020, p.

was repaired and Diablo Canyon Unit 2 returned to 100 percent power on August 4, 2020.⁸ The notification by PG&E that Diablo Canyon Unit 2 was potentially unreliable just as CAISO issued the RMO ahead of the August 14-15, 2020 heat wave, when Unit 2 had recently been repaired and was fully operational, should be examined as an element of this proceeding to confirm the legitimacy of the forced outage notification.

Another critical issue that should be examined in this proceeding involves the operating reserve margin (ORM) at which CAISO initiates rolling blackouts. CAISO initiated the blackouts when its ORM dropped below 6 percent. However, the NERC standard, and CAISO's own Stage 3 Emergency definition, directs the use of rolling blackouts (load interruption) when the ORM drops to 3 percent.^{9,10} The difference between a 3 percent ORM and a 6 percent ORM at the time of the blackouts on August 14th and 15th was about 1,500 MW.¹¹ In fact, CAISO's real-time accounting of available capacity on its public website indicated that it initiated the rolling blackout on August 15, 2020 at an ORM of approximately 9 percent.¹² Despite many CAISO actions that limited available supply, no blackouts would have occurred on August 14-15, 2020 if CAISO had adhered to a 3 percent ORM as the trigger level to initiate rolling blackouts.

II. THE COMMISSION SHOULD NOT CONSIDER EXPEDITED PROCUREMENT OF GAS-FIRED RESOURCES TO BE ONLINE FOR SUMMER 2021 AND 2022

The OIR neither establishes nor points to any source that supports a need for new gas-fired procurement, yet this proceeding seemingly presumes such a need for 2021. More than adequate supply

4. "The cause of the increased hydrogen usage was due to a leak in a weld segment located on the Unit 2 Main Generator Exciter End stator coil cooling water manifold."

⁸ NRC, Power Reactor Status Report for August 04, 2020 (accessed November 29, 2020): <https://www.nrc.gov/reading-rm/doc-collections/event-status/reactor-status/2020/20200804ps.html>.

⁹ CAISO, *2020 Summer Loads and Resources Assessment*, May 15, 2020, Figure 26, p. 42. Stage 3 Emergency range = 0 to 3 percent operating reserve margin.

¹⁰ CAISO, *System Alerts, Warnings and Emergencies – Fact Sheet*, May 2018: <https://www.caiso.com/documents/systemalertswarningsandemergenciesfactsheet.pdf>. "Stage 3 Emergency = CAISO is unable to meet minimum contingency reserve requirements, and load interruption is imminent or in progress. Notice issued to utilities of potential electricity interruptions."

¹¹ The CAISO demand was approximately 45,000 MW on August 14th and 15th when the blackouts were initiated. Three percent of 45,000 MW = $0.03 \times 45,000 \text{ MW} = 1,500 \text{ MW}$.

¹² Calculation of real-time operating reserve margin during August 15, 2020 rolling blackout, D. Marcus, September 22, 2020. See **Attachment B**.

was available on August 14-15, 2020 to meet demand. The focus in the OIR on increasing supply and reducing demand for the summer of 2021 imply that these issues were the core contributors to the August 14-15, 2020 rolling blackouts. The facts will establish that these factors were not the core contributors to the blackouts. To avoid a reoccurrence of the blackouts from the summer of 2021, this proceeding should be primarily focused on the mismanagement of the adequate supply that was available to meet the demand on August 14-15, 2020, and should identify and take the steps needed to rectify the causes of that mismanagement.

III. CAISO SHOULD NOT USE ITS CAPACITY PROCUREMENT MECHANISM TO PROCURE ADDITIONAL CAPACITY FOR THE SUMMER OF 2021.

At the least, the Commission should provide parties the opportunity to submit evidence to establish whether or not additional capacity is in fact needed in 2021 before it both presumes a fact not in evidence or acts to require additional unneeded procurement. California ratepayers already bear a heavy burden to pay for reserve capacity. Increasing those reserves without fixing the CAISO grid management practices that led to the August 14-15, 2020 blackouts would result in unnecessary procurement and thus unjust and unreasonable costs to ratepayers.

The CAISO should bear the burden to prove that its CPM should be exercised. The Commission should not act preemptively to presume that the CPM should be exercised without identifying the facts necessary to call upon the CPM. The Commission owes a duty to the ratepayers to protect them from unjust and unreasonable costs. The extraordinary costs accruing from the CAISO's exercise of its emergency CPM purchasing authority fall on California's ratepayers. CAISO has no mandate to take ratepayer interests into account before it adds costs. The Commission is the only California government entity that can protect the ratepayers from unnecessary procurement and unjust costs.

IV. PRIOR TO THE SUMMER OF 2021 AND THE IMPOSITION OF ADDITIONAL PROCUREMENT MANDATES, THE COMMISSION SHOULD REVERSE THE ATTRITION AND LOSS OF CAPACITY IN EXISTING UTILITY DR PROGRAMS THAT HAS OCCURRED OVER THE LAST EIGHT YEARS

CAISO has resisted expanding use of demand response (DR) resources in the past, despite DR's prioritization at the top of the Loading Order for new resources. CAISO's institutional resistance to DR has been effective. In 2012, CAISO identified 2,296 MW of DR at its disposal to offset demand at the summer peak.¹³ In 2020, CAISO identified only 1,339 MW of DR available for this purpose.¹⁴ Had CAISO simply maintained the amount of DR available to it in 2012 through 2020, it would have possessed an additional 957 MW of DR to deploy on August 14th and 15th instead of calling rolling blackouts. The Commission should increase incentives, reduce dispatch activity limits, and clarify its expectations regarding when programs are dispatched, to replenish this nearly 1,000 MW of the formerly available DR capacity by the summer of 2021. The onerous dispatchability requirements that CAISO has placed on DR resources should also be relaxed as necessary to increase available DR capacity.

V. THE COMMISSION SHOULD ALLOW BTM HYBRID-SOLAR-PLUS-STORAGE ASSETS TO PARTICIPATE IN ANY PROCUREMENT MANDATE FOR 2021.

The Commission should allow BTM hybrid-solar-plus-storage assets to participate and to discharge their available capacity in excess of onsite load to the grid and receive compensation for the load reduction, including exported energy. These systems have already been successfully demonstrated in California and other parts of the country.

SCE signed a contract with Stem Inc. in 2014 to build and operate an 85 MW_{AC} VPP consisting of distributed energy storage systems in more than 100 commercial buildings.¹⁵ Stem dispatched these distributed storage systems more than two dozen times in 2017, often after sunset when solar power could not be utilized to meet increasing evening loads. The VPP's performance demonstrated that aggregated commercial building BTM battery storage is consistently reliable and can be dispatched quickly.

¹³ CAISO, *2012 Summer Loads and Resources Assessment*, March 15, 2020, Table 1, p. 4.

¹⁴ CAISO, *2020 Summer Loads and Resources Assessment*, May 15, 2020, p. 5.

¹⁵ Smart Electric Power Alliance, *Non-Wires Alternatives - Case Studies from Leading U.S. Projects, Appendix: Southern California Edison—Distributed Energy Storage Virtual Power Plant*, November 2018, pp. 70-73.

Green Mountain Power (GMP), a Vermont utility, began offering retail customers 13.5 kWh battery storage units for \$15 per month in 2017.¹⁶ The revenue to be generated by participation in the VPP enabled GMP to sell these battery storage units to customers for \$1,500, about 20 percent of the \$7,000 full installed capital cost of the battery.¹⁷ This VPP project reached its full build-out of 2,000 residential units in 2019. The project is meeting revenue expectations.¹⁸ GMP saved \$500,000 during a July 2018 heat wave by dispatching 500 of these Tesla Powerwall™ batteries to operate as a VPP.¹⁹

BTM hybrid-solar-plus-storage is a proven technology that should be used to the maximum degree feasible in the summer of 2021.

VI. THIS PROCEEDING SHOULD ASSESS CAISO'S ABILITY TO CONDUCT ACCURATE DAY-AHEAD FORECASTS DURING HEAT WAVES, BEFORE ALLOWING ADDITIONAL SUMMER 2021 LOAD FORECASTS

This proceeding should not direct the CEC, CAISO, or the Commission to conduct additional analyses regarding summer 2021 load forecasts outside the ongoing procurement-related proceedings that the Commission has already set up to consider and analyze these issues. The Commission should not consider a mechanism to update RA requirements for the summer of 2021 or direct CAISO to use its capacity procurement mechanism (CPM) to procure additional capacity for the summer of 2021. The facts show that the summer 2020 CAISO forecast was quite accurate. What was unanticipated was CAISO's inability effectively to manage the procurement, reserve, and capacity assets at its disposal to meet the August 14-15, 2020 heat wave and ensure reliability. The facts show that CAISO ordered the rolling blackouts at demand levels that were less, at 45,716 MW and 44,524 MW respectively, than the

¹⁶ The customer could choose to own the Tesla Powerwall after 10 years of payments, or to make a one-time upfront \$1,500 payment to purchase the unit outright.

¹⁷ Electronic communication between B. Powers, Powers Engineering, and J. Castonguay, Chief Innovation Officer, Green Mountain Power, October 26, 2017. Installed all-in cost of 13.5 kWh Powerwall is about \$7,000 on average.

¹⁸ Green Mountain Power, *GMP – Grid Transformation Innovative Pilot – Update*, prepared for Vermont Public Utility Commission, April 15, 2019, p. 3.

¹⁹ Utility Dive, *Tesla batteries save \$500K for Green Mountain Power through hot-weather peak shaving*, July 23, 2018. See: <https://www.utilitydive.com/news/tesla-batteries-save-500k-for-green-mountain-power-through-hot-weather-peak/528419/>. Tesla completed the 2,000-unit Powerwall™ deployment in 2019.

CAISO summer 2020 forecast 1-in-2 one-hour peak load of 45,907 MW.^{20,21} Augmenting supply for the summer of 2021, when availability of supply was not the cause of August 2020 blackouts, will not prepare the state to ensure reliability during any heat waves that might occur in 2021. Authorizing CPM procurement to augment supply, when supply constraints were not a cause of the August 14-15, 2020 rolling blackouts, would conflict with the Commission's statutory obligation to ensure just and reasonable rates.

This proceeding should examine closely the accuracy of CAISO's day-ahead forecasts in the week following the August 14-15, 2020 blackouts. The day-ahead forecast for Monday, August 17th, was nearly 5,000 MW higher, at 49,825 MW, than the actual peak of 45,094 MW. The next day, August 18th, the day-ahead forecast was 3,300 MW higher, at 50,485 MW, than the actual peak of 47,067 MW.²² CAISO asserts that extraordinary voluntary conservation is the reason for the discrepancy between these day-ahead forecasts and the actual peak demand,²³ implying that the forecasts were accurate and the exceptional voluntary conservation was unanticipated.

These exceptionally high day-ahead demand forecasts created near-panic in California in the wake of blackouts on August 14th and 15th. The CAISO provides no evidence to support its position that unexpected voluntary conservation was the only reason for the large difference between the day-ahead forecasts on August 18th and 19th and actual peak demand on those days. The Commission should examine whether the forecasts themselves were highly inaccurate. The Commission should corroborate whether the CAISO possesses the capability to conduct accurate day-ahead forecasts during heat waves, as the efficient allocation of supply resources depends largely on those day-ahead forecasts.

The day-ahead demand forecasts of large California public utilities, LADWP and SMUD, and investor-owned utilities in neighboring states that were subject to the same heat wave (Arizona Public Service, Tucson Electric Power, NV Energy) should be evaluated to determine if the CAISO high day-ahead forecasts for August 17-19, 2020 were an outlier or were consistent with the day-ahead forecasts of major California public utilities and IOUs in neighboring states. This information should be used to

²⁰ CAISO, *2020 Summer Loads and Resources Assessment*, May 15, 2020, p. 3.

²¹ CAISO, CAISO Today's Outlook – Demand: <http://www.caiso.com/TodaysOutlook/Pages/default.aspx>. See “demand trend” curves for August 14, 2020 and August 15, 2020.

²² Ibid. See “demand trend” curves for August 17, 2020 and August 18, 2020.

²³ CAISO/CPUC/CEC, *Preliminary Root Cause Analysis*, October 6, 2020, p. 39. “As a result of the conservation messaging and awareness created by the State of Emergency, the state was successful in significantly reducing peak demand by as much as 4,000 MW (compared to day-ahead forecasts) on August 17 through 19.”

assess whether CAISO's day-ahead forecasts for the August 17-19, 2020 period were erroneously high. If so, action must be taken to improve the accuracy of CAISO day-ahead forecasts in the midst of heat waves, not used to justify supplemental CPM procurement for the summer of 2021.

VII. CONCLUSION

For the foregoing reasons, PCF requests that this rulemaking be expanded to include an examination of the CAISO's grid management practices and rules, and that the Commission require the CAISO to forego exports during tight supply conditions, before the Commission orders additional procurement of any kind. PCF also requests that parties have the opportunity to submit additional facts regarding both: 1) the events that caused the August 14-15, 2020 blackouts and 2) CAISO's grid management practices, and that the Commission evaluate those facts and evidence prior to ordering additional procurement.

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November 30, 2020

ATTACHMENT A

**BEFORE THE PUBLIC UTILITIES COMMISSION OF THE
STATE OF CALIFORNIA**

Order Instituting Rulemaking to Oversee the
Resource Adequacy Program, Consider
Program Refinements, and Establish Forward
Resource Adequacy Procurement Obligations

Rulemaking 19-11-009
(Filed November 7, 2019)

**RESPONSE OF THE
CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION
TO DATA REQUEST NUMBER PCF-CAISO-2020RA-02
BY PROTECT OUR COMMUNITIES FOUNDATION**

Request Date: 10/12/2020

Response Date: 11/16/2020

Below are the California Independent System Operator Corporation's (CAISO) responses to Protect Our Communities Foundation (PCF) Data Request – PCF-CAISO-2020RA-02.

General Objections

The CAISO objects to PCF's data request because it is unduly burdensome and intrusive. PCF's data request relates to resource performance from August 14, 2020 through August 26, 2020 and September 5, 2020 through September 7, 2020. Furthermore, the CAISO objects to the extent any questions call for information that is privileged, attorney-client work product, or otherwise confidential.

In addition, to the extent possible, the CAISO provides responses to PCF's specific questions below.

PCF Request No. 1

Please provide the megawatt output for each of the following OTC units for August 14-26 and Sept 5-7 from during the hours ending (HE) 13 to 24.

- 1.1. Huntington Beach 2
- 1.2. Alamitos 3
- 1.3. Alamitos 4
- 1.4. Alamitos 5
- 1.5. Redondo Beach 5

- 1.6. Redondo Beach 6
- 1.7. Redondo Beach 8
- 1.8. Ormond Beach 1
- 1.9. Ormond Beach 2

The attached spreadsheet is provided for ease of response.

CAISO Response to Request No. 1

PCF Request No. 1 is unduly burdensome, overly broad, intrusive, and not reasonably calculated to lead to the discovery of admissible evidence in the resource adequacy (RA) proceeding. Specific generation outage details, as opposed to aggregate data, are not directly relevant to RA Program.

Notwithstanding the objections above, the CAISO provides its response in the attached Excel spreadsheet.

**Day/hour output (MW) of SoCal OTC boiler plants proposed for extended operation,
August 14-26, Sept 5-7, 2020 heat wave**

Date/hour	Huntington Beach 2 (215 MW)	Alamitos 3 (320 MW)	Alamitos 4 (320 MW)	Alamitos 5 (480 MW)	Redondo Beach 5 (175 MW)	Redondo Beach 6 (175 MW)	Redondo Beach 8 (480 MW)	Ormond Beach 1 (806 MW)	Ormond Beach 2 (806 MW)
13-Aug-20									
HE13	0	86	0	0	75	41	131	0	400
HE14	0	87	0	0	75	34	132	0	398
HE15	0	134	0	0	77	11	132	1	706
HE16	0	283	0	2	80	10	228	0	704
HE17	0	291	0	4	75	10	378	0	704
HE18	0	289	0	6	80	10	401	0	704
HE19	0	291	0	20	0	39	450	0	705
HE20	0	290	0	63	0	10	453	0	704
HE21	0	314	0	71	0	10	459	0	705
HE22	0	192	0	71	0	10	455	1	656
HE23	12	120	0	71	0	10	209	-1	407
HE24	24	50	0	151	0	10	132	0	406
14-Aug-20									
HE13	204	267	0	240	0	10	241	8	404
HE14	208	315	0	239	0	15	251	12	492
HE15	220	312	0	240	0	108	363	17	686
HE16	220	315	0	400	0	147	430	21	713
HE17	220	313	0	448	0	140	430	21	713
HE18	220	312	0	472	0	140	435	21	715
HE19	220	314	0	476	0	140	462	20	720
HE20	222	314	0	477	0	140	459	40	721
HE21	220	313	0	476	0	140	455	102	723
HE22	190	315	0	476	0	137	231	99	726
HE23	64	313	0	328	0	15	196	104	712
HE24	66	313	0	183	0	21	181	105	699
15-Aug-20									
HE13	65	189	0	275	0	21	270	429	407
HE14	222	314	0	468	0	137	382	703	693
HE15	221	313	0	473	0	140	438	710	703
HE16	223	314	0	472	0	140	441	710	702
HE17	222	314	0	472	0	139	441	709	701
HE18	221	313	0	472	0	140	459	706	703
HE19	224	315	0	472	0	141	460	707	702
HE20	222	315	0	473	0	140	461	708	702
HE21	211	226	0	405	0	134	437	607	601
HE22	111	201	0	349	0	21	299	696	698
HE23	65	181	0	198	0	21	181	695	700
HE24	0	116	0	184	0	21	181	499	700
16-Aug-20									
HE13	65	189	0	244	0	21	241	419	411
HE14	221	311	0	462	0	138	441	700	700
HE15	221	315	0	471	0	141	446	702	706
HE16	220	315	0	471	0	141	445	703	705
HE17	222	316	0	471	0	141	447	703	707
HE18	219	313	0	470	0	142	449	701	707
HE19	216	315	0	470	0	141	450	706	707
HE20	213	256	0	412	0	92	377	706	709
HE21	80	135	0	231	10	21	181	707	710
HE22	65	72	0	180	9	20	181	707	710
HE23	66	21	0	179	8	21	181	705	709
HE24	65	20	0	179	10	21	181	409	404
17-Aug-20									
HE13	66	264	58	470	9	21	453	656	687

HE14	217	309	21	472	42	140	439	657	686
HE15	213	311	21	472	85	142	441	654	693
HE16	195	311	22	472	106	141	441	654	693
HE17	193	309	39	473	107	141	440	656	692
HE18	0	309	70	472	107	140	452	652	689
HE19	0	306	68	473	106	141	449	652	689
HE20	0	306	69	473	105	140	452	651	688
HE21	0	289	52	472	68	141	449	652	689
HE22	0	234	21	473	0	109	441	650	689
HE23	0	190	18	374	0	21	209	652	689
HE24	0	129	21	210	0	21	181	651	691
18-Aug-20									
HE13	0	311	320	472	0	141	442	657	697
HE14	0	312	320	473	0	141	440	653	697
HE15	0	312	320	474	0	141	441	658	700
HE16	0	311	318	471	0	142	440	660	700
HE17	0	311	317	472	0	140	415	662	702
HE18	0	313	319	472	4	140	441	662	700
HE19	0	311	318	471	10	140	440	660	699
HE20	0	312	321	471	52	140	441	650	693
HE21	0	312	319	471	52	140	440	660	696
HE22	0	312	317	460	11	137	440	657	697
HE23	0	158	316	460	10	21	440	587	674
HE24	0	84	170	262	10	20	227	401	400
19-Aug-20									
HE13	0	56	61	472	51	21	440	653	696
HE14	0	155	155	472	50	21	441	653	698
HE15	0	312	320	473	51	76	440	653	699
HE16	0	312	320	473	50	140	442	655	699
HE17	0	314	321	472	44	140	440	656	700
HE18	0	313	320	473	11	140	440	655	698
HE19	0	314	316	473	10	140	441	654	700
HE20	0	314	319	473	10	135	453	648	697
HE21	0	182	243	317	10	21	214	410	408
HE22	0	120	168	223	10	20	211	485	423
HE23	0	49	103	179	10	21	181	413	410
HE24	0	21	35	161	11	21	180	411	410
20-Aug-20									
HE13	22	255	239	219	23	32	224	591	655
HE14	65	312	303	372	50	58	211	634	681
HE15	205	314	318	467	10	21	366	642	669
HE16	215	312	321	465	83	94	441	653	694
HE17	206	314	322	466	105	140	441	602	495
HE18	174	314	319	466	105	141	440	631	639
HE19	65	310	295	466	105	140	441	406	410
HE20	21	246	127	360	100	134	367	404	411
HE21	20	236	90	213	10	21	281	403	414
HE22	21	154	37	179	10	20	181	403	410
HE23	21	85	22	180	10	21	181	361	355
HE24	21	21	21	152	10	20	181	208	256
21-Aug-20									
HE13	86	40	40	221	10	23	272	520	464
HE14	113	26	28	242	10	21	425	543	641
HE15	176	95	95	219	10	20	440	543	639
HE16	206	195	195	371	103	140	440	427	413
HE17	195	192	194	466	105	140	441	549	506
HE18	190	202	213	466	104	140	441	493	464
HE19	190	192	198	467	104	140	336	399	406
HE20	191	190	196	410	104	119	240	400	425
HE21	143	190	193	237	104	76	198	404	404
HE22	66	121	125	222	11	21	181	385	406
HE23	65	51	58	179	10	21	180	201	399

HE24	0	22	18	181	10	0	187	104	255
22-Aug-20									
HE13	66	21	19	152	10	0	131	104	54
HE14	119	99	97	176	20	0	190	328	326
HE15	140	191	191	186	31	0	292	604	600
HE16	63	189	194	152	105	0	300	424	412
HE17	64	313	319	242	105	0	301	410	404
HE18	65	313	320	228	105	0	301	414	413
HE19	66	311	283	251	105	0	303	413	414
HE20	65	262	218	250	105	0	300	413	414
HE21	65	191	193	250	100	0	288	411	414
HE22	65	119	125	180	10	0	181	203	380
HE23	65	50	58	180	10	0	187	103	108
HE24	65	21	21	203	11	0	137	107	56
23-Aug-20									
HE13	65	22	21	180	10	0	181	104	54
HE14	65	92	93	215	104	0	225	196	237
HE15	66	189	190	251	105	0	342	415	409
HE16	115	187	195	250	105	0	438	410	411
HE17	195	186	194	251	105	0	439	419	414
HE18	61	191	193	250	105	0	439	421	416
HE19	0	189	193	250	105	0	439	421	414
HE20	0	195	194	251	105	0	439	415	414
HE21	0	191	193	251	105	0	430	414	412
HE22	0	120	126	180	10	0	211	411	421
HE23	0	52	59	179	11	0	181	205	383
HE24	0	20	19	181	10	0	181	198	255
24-Aug-20									
HE13	0	190	194	181	10	0	205	413	407
HE14	0	243	232	242	10	1	242	655	695
HE15	0	311	320	373	43	10	440	655	701
HE16	0	311	321	464	10	10	440	657	703
HE17	0	310	320	464	10	10	441	655	706
HE18	0	310	318	466	27	10	431	657	705
HE19	0	310	306	464	10	0	431	655	706
HE20	0	309	309	466	10	0	431	656	705
HE21	0	310	310	464	10	0	432	657	705
HE22	0	309	308	463	10	0	425	656	701
HE23	0	152	161	273	9	0	227	402	401
HE24	0	85	96	178	0	0	181	403	400
25-Aug-20									
HE13	0	94	93	330	10	0	181	309	408
HE14	0	192	193	466	10	0	240	422	408
HE15	0	278	260	466	10	0	417	424	411
HE16	0	312	319	466	10	0	430	654	680
HE17	0	311	320	466	10	0	431	656	699
HE18	0	312	317	466	10	0	435	654	698
HE19	0	312	321	466	10	0	432	655	701
HE20	0	312	265	466	10	0	312	655	700
HE21	0	284	193	375	10	0	253	657	701
HE22	1	189	193	241	11	0	226	637	688
HE23	11	132	137	181	11	0	181	401	401
HE24	21	67	77	152	10	0	181	402	402
26-Aug-20									
HE13	66	23	25	189	10	0	181	211	253
HE14	94	98	100	230	10	0	363	233	296
HE15	133	188	193	242	10	0	380	411	305
HE16	207	313	320	438	10	0	271	475	308
HE17	219	311	319	466	10	0	270	653	304
HE18	0	311	320	465	10	0	271	655	306
HE19	0	312	322	466	103	0	271	654	305

HE20	0	262	256	466	30	0	271	655	303
HE21	0	192	197	466	10	0	260	654	304
HE22	0	193	195	465	10	0	229	655	306
HE23	0	122	126	275	10	0	181	357	301
HE24	0	54	61	180	10	0	181	120	257

5-Sep-20									
HE13	65	190	193	223	10	20	239	413	411
HE14	108	240	246	305	10	39	241	651	680
HE15	174	249	243	347	10	20	279	655	696
HE16	176	313	319	471	85	80	341	657	697
HE17	175	314	321	471	110	80	413	656	697
HE18	175	314	323	469	110	80	439	655	698
HE19	174	315	319	469	110	80	446	657	697
HE20	175	311	295	405	110	31	455	655	697
HE21	131	200	195	244	111	20	455	655	698
HE22	67	125	127	241	97	20	448	477	698
HE23	60	56	60	241	11	20	216	401	388
HE24	21	21	23	185	10	20	131	385	254
6-Sep-20									
HE13	176	293	291	348	109	80	412	489	507
HE14	174	315	322	474	110	81	441	655	690
HE15	175	314	318	472	110	81	440	654	694
HE16	175	315	319	472	109	81	440	658	699
HE17	175	315	318	472	109	81	440	659	702
HE18	174	314	320	474	110	80	439	656	704
HE19	175	316	320	472	110	81	441	652	701
HE20	177	312	319	472	110	81	450	656	702
HE21	176	314	317	472	110	80	441	656	706
HE22	167	316	323	472	12	20	429	655	706
HE23	60	152	173	333	10	20	189	389	383
HE24	21	87	110	203	10	20	188	214	259
7-Sep-20									
HE13	66	193	195	242	10	20	241	405	405
HE14	66	187	193	241	10	20	240	655	695
HE15	66	192	193	241	10	20	240	655	701
HE16	64	192	191	255	10	20	240	656	700
HE17	65	191	193	263	39	30	240	656	700
HE18	65	190	193	266	77	80	240	659	700
HE19	65	191	194	241	110	80	240	659	702
HE20	65	192	195	241	109	80	240	658	704
HE21	65	191	195	240	108	70	241	657	703
HE22	65	190	194	241	11	20	233	422	702
HE23	59	161	159	182	10	20	181	170	376
HE24	22	94	101	178	10	20	181	107	100

ATTACHMENT B

ISO data for 8/15/20

load	available generation ¹	reserves	time	ISO alert level	solar MW	wind MW
		>12%		1800 Warning	4188	1306
		>11%		1805 Warning	3788	1254
		>11%		1810 Warning	3396	1226
		>10%		1815 Warning	3065	1227
		>10%		1820 Warning	2804	1240
44505	48774	9.59%		1825 Stage 2	2326	1270
43960	47872	8.90%		1830 Stage 3	2057	1321
43572	47976	10.11%		1835 Stage 3	1903	1428
43522	47835	9.91%		1840 Stage 3	1664	1534
43435	47759	9.96%		1845 Stage 3	1502	1669
43529	47803	9.82%		1850 Stage 2	1345	1830
43457	48080	10.64%		1855 Stage 2	1192	1929
43363	47973	10.63%		1900 Stage 2	1054	1997
43149	47569	10.24%		1905 Stage 2	913	2047
42970	47368	10.24%		1910 Stage 2	787	2071

Sources:

Load and available resources: <http://www.caiso.com/TodaysOutlook/Pages/default.aspx>

(non-archived #s from top of page, not graphs)

Wind and solar generation: <http://www.caiso.com/TodaysOutlook/Pages/supply.aspx>

(note that generation data is archived)

1) Load and "available generation" values recorded in real-time at 5-minute intervals from CAISO Today's Outlook "Demand" web page

D. Marcus, 9/22/20